DESIGN PROPOSAL FOR A SUSTAINABLE PUBLIC MARKET IN BARANGAY MINUYAN, NORZAGARAY, BULACAN

A Research Project

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La Concepcion College, SDJM Bulacan

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Science in Civil Engineering

Major in Construction Engineering

and Management

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RECOMMENDATION

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CERTIFICATE OF ORIGINALITY

This certificate demonstrates the fact that the work was original to the researchers and that no other individual or group has written or published it before. Additionally, it declares that until proper acknowledgement has been given to them, no honors or recognition from other universities, colleges or higher education institutions were claimed here.

On top of that, we claim that our study's intellectual content is the product of our hard work, which required using both simple terminology and efficient presentation methods in addition to the group's original ideas.

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CHAPTER 1

The Problem and its Background

Introduction

Constructing a public market is a big help to the community. Especially if this market supports environmental sustainability. Building a market has many obligations, there is economic growth, trade with local businesses and community relations while supporting environmental responsibility. If a sustainable market is environmentally friendly, it will reduce waste from the market, save electricity and water. A public market is a big help in an area especially if it is accessible to popular attractions. Like Barangay Minuyan Norzagaray Bulacan where we noticed that it is accessible to tourists going to popular places like rivers and campsites. In barangay Minuyan Norzagaray Bulacan there is no public market or talipapa, residents have to travel 15 to 20 mins to go to the other barangay to buy food, medicine and others because that is the only public market closest to them.

Our study proposes finding a solution to this problem by constructing and designing a sustainable public market for the residents of Barangay Minuyan

Norzagaray Bulacan. So that they no longer have to travel long distances just to buy daily necessities while maintaining a clean and environmentally friendly environment.

Our goal is to create a plan that directly benefits the residents. By constructing a market that utilizes solar panels, water tanks and install proper drainage, we aim to ensure its sustainability. We also believe this market will greatly benefit Barangay Minuyan by becoming a stopover for tourists traveling to nearby attractions, allowing them to purchase their needs conveniently.

Background of the Study

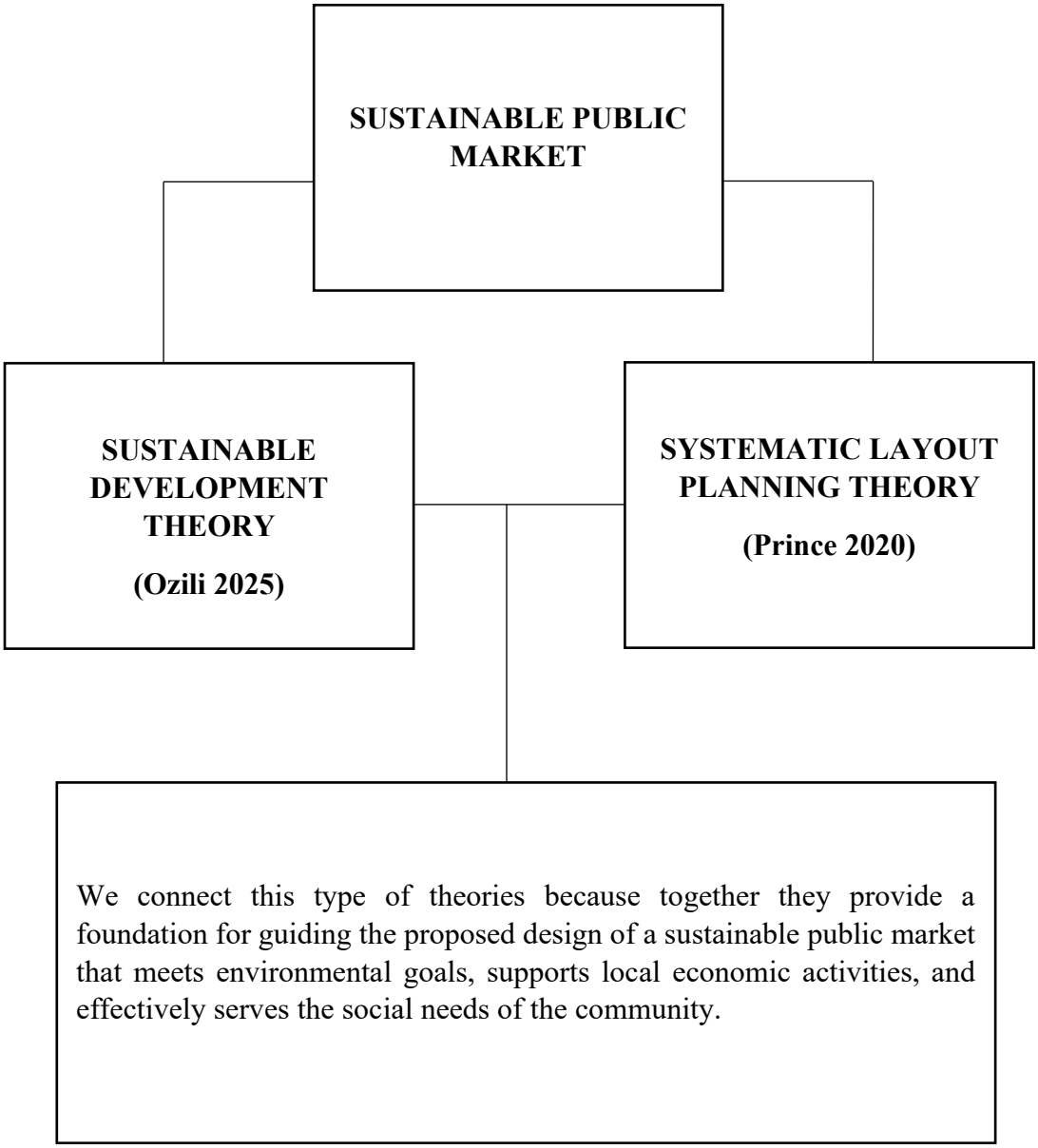
The researchers conducted this study in Barangay Minuyan Norzagaray Bulacan, especially its residents. The construction of a sustainable public market serves as a vital element in local trade, social interaction and community livelihood. Particularly in growing municipalities, such as Barangay Minuyan. However, we know that today's markets also face problems or issues, such as hygiene problems, issues with improper use of resources, and above all, a lack of maintaining the market's infrastructure in order and strength. People always want something that can easily provide or offer of what they need every day. And that is "Food", people need food because it is a fundamental psychological requirement for human survival. It is the first necessity of people. In Barangay Minuyan, Norzagaray, Bulacan residents, we've noticed that is hard for them to get food quickly. They usually used transportation to

go where they can easily buy food because other nearby store is unable to provide their needs.

Building a sustainable market requires responsibility for the environment and oneself, contributing to economic development and social cohesion. We, the researchers, are conducting a study to build a well-organized, clean, and sustainable public market that is beneficial to residents and tourists passing through Barangay Minuyan. Nowadays, we need to be resourceful and smart so as not to harm the environment while promoting a construction or project. That is why we thought of using and implementing energy efficiency, waste reduction, and using natural ventilation and using local materials while prioritizing local vendors and expanding the community. This study aims to meet the needs of a community by developing and designing an innovative, durable, clean and spacious sustainable public market. While improving the functionality and accessibility of the market by using sustainable materials and technology in the construction of the market This project supports the local economy and community well-being. The public market we will conduct is in line with the proper use of resources and the limitation of environmental damage, thereby maintaining the long-term sustainability and growth of the community. This proposed decision will be the reference of the local government unit to create a managed public market that not only has economic and social objectives, but also includes the principles of maintaining a healthy and clean environment. In its advancement, it will strengthen the quality of life and the city, promote local

livelihoods and promote community stability in Barangay Minuyan Norzagaray Bulacan.

Theoretical Framework


SUSTAINABLE PUBLIC MARKET
SUSTAINABLE DEVELOPMENT THEORY
(Ozili 2025)
SYSTEMATIC LAYOUT PLANNING THEORY
(Prince 2020)
We connect this type of theories because together they provide a foundation for guiding the proposed design of a sustainable public market that meets environmental goals, supports local economic activities, and effectively serves the social needs of the community.

Conceptual Framework

Input	Process	Output
1. What is the profile of the respondent with regards to: 1.1 Age 1.2 Gender 1.3 Role/ Position	1.Survey	The study will produce a summary of the respondents' age, gender, and roles in the community of Barangay Minuyan Norzagaray Bulacan, allowing the researchers to understand the people who will benefit from the proposed public market.
2.How do the existing conditions and the absence of public market affect on the community in terms of? 2.1 Accessibility 2.2 Safety 2.3 Convenience	2. Data Gathering	The study will show how the current situation and the lack of a public market in Barangay Minuyan Norzagaray Bulacan affect the community's daily life including their ease of access to goods, safety in public areas, and convenience for residents.
3. How can the structural specifications of the proposed sustainable public market be assessed in terms of: 3.1 Load-bearing capacity and stability of the structure 3.2 Choosing materials for durability and sustainability 3.3 adherence with the National Structural Code of the Philippines (NSCP) and local design standards	3. Designing the sustainable public market	The study will provide an evaluation of the structural requirements needed to ensure that the proposed market is durable, safe for residents, and compliant with design standards.

4.How does the assessment of constructing of a proposed public market be sustainable in terms of: 4.1 Cost analysis 4.2 Long-term use	4. Estimating and Interpretation of gathered data	The study will evaluate the proposed public market in Barangay Minuyan Norzagaray Bulacan, showing that it is cost-efficient, environmentally friendly and capable of providing long-term benefits to the community.

Statement of the Problem

In this study, the researchers aimed to identify the data that should be considered in the establishment and design of a sustainable public market. Furthermore, the researchers sought to answer the following questions.

1. How does the demographic profile of the respondent be measured in terms of:

    1.1 Age

    1.2 Gender

    1.3 Role/ Position

2 How do the existing conditions and the absence of public market affect on the community in terms of?

    2.1 Accessibility

    2.2 Safety

    2.3 Convenience

3 How can the structural specifications of the proposed sustainable public market be assessed in terms of:

3.1 Load-bearing capacity and stability of the structure

3.2 Choosing materials for durability and sustainability

3.3 Adherence with the National Structural Code of the Philippines (NSCP) and local design standards

4. How does the assessment of constructing of a proposed public market be sustainable in terms of:

4.1 Cost analysis

4.2 Long-term use

Objective of the study

The researchers aims to accomplish the following objectives. The results will be a guide the design of sustainable public market and solve the problems in Barangay Minuyan, Norzagaray, Bulacan

1. To conduct surveys among residents in Barangay Minuyan to determine their demographic profile in terms of gender, age and role/position
2. To access the current condition and needs of the residents in Barangay Minuyan in the absence of public market focusing on accessibility, safety and convenience

3. To plan and identify the structural specifications of the proposed sustainable public market in terms of load capacity, material durability and compliance with building standards.
4. To evaluate the sustainability of constructing the public market in terms of cost efficiency and long term use.

Hypothesis

This study will use alternative and null hypotheses to assess the design of a sustainable public market for the residents of Minuyan Norzagaray Bulacan.

Ha. The design proposal for a sustainable public market in Barangay Minuyan, Norzagaray, Bulacan significantly improves environmental sustainability, community engagement, and economic viability.

Ho. The design proposal for a sustainable public market in Barangay Minuyan, Norzagaray, Bulacan has no significant effect on environmental sustainability, community engagement, or economic viability.

Significance of the Study

This study aims to highlights the importance of developing a sustainable pubic market at Barangay Minuyan Norzagaray Bulacan through proposing a design. This research will be significant to different people in academe and to whom it will be deemed as beneficial as stated below.

For the researcher -The outcome of this study could help to improve their own community or environment that encourages to be environmentally responsible. Also, it can be used as a reference for future research.

For Professor/Instructor - This study may be beneficial to student researcher who works to plan their own design in constructing infrastructure by protecting the environment. It can also help professors to used this study as a reference for the future researchers.

For Local Residence - Our study is very valuable especially to the residents of Barangay Minuyan Norzagaray Bulacan. The results show that everything is connected to the construction of a sustainable public market. This will help them understand how a well-organized, clean, and sustainable shopping market will affect their long-term use.

For the School and the School Administration - The school can use this study to attract more researchers and construction companies. They may want to work with the school and the person in charge of the project to learn how to do this kind of study.

Also, if our engineer, professor, or instructor publishes the study, it will help improve the school's reputation.

To the Researchers Themselves – This study will help researchers learn more about other possible actions and uses in building a sustainable public market, to avoid harming the environment and help nature.

Scope and Limitations

The project aims to give a sustainable public market for immediate support for people needs essentially in disaster response to ensure survival, dignity, and stability for affected residents, particularly Barangay Minuyan. This study focus on the structural design of the market including load bearing capacity, material selection, basic site layout, and conceptual sustainability features. The results may not apply to all places because of differences in local resources, cultures and needs. There limitations in the study that can affect the development of this project such as the design is preliminary and conceptual with structural analysis using STAAD pro and cost estimate are preliminary and based current local prices. Detailed interior layouts, electrical, plumbing, and mechanical systems are not include, and local availability of sustainable materials and regulatory constraints may affect the full implementation of the proposed market. By acknowledging this needs, we propose delivering timely, tailored solutions to create meaningful change in the community.

Definition of Terms

Design / Building – for the process of creating solutions, balancing functionality, aesthetics and user needs.

Informal Market – this is what the researchers want to avoid.

Local Resident– they are the respondents of the study.

Open Ventilation – allowing fresh air to flow freely into and out of a space or a structure to improve air quality and reduce indoor pollutants.

Public Market – it is what the researchers are trying to achieve in the research.

Solar Panels – this is a foundation of renewable energy systems, which can contribute to environmental sustainability.

Sustainable– this is to avoid harming the environment and help nature.

Surveying Questionnaire – these are the materials that have been used to gather the data.

Water Conservation – means carefully managing and using water resources wisely to avoid unnecessary usage and ensure availability for future needs.

CHAPTER 2

Review of Related Literature and Study

Foreign Literature

Base on the article of Budi S. et la, (2021) Entitled “Sustainability Status and Optimization of the Public Market Performance” The purpose of this study was to analyze the performance value of the Tem- puran Public Market, Magelang Regency based on Standard National Indonesia (SNI) and the detailed status for sustainability with Multidimensional Scaling (MDS). MDS analysis is used to assess the status of successful implementation and market sustainability. The application of SNI is indeed to accelerate and facilitate the managing agency in assessing market performance, but in actual conditions in the SNI field, it still needs to be detailed because each criterion still has standards that must be met in more detail. Leverage factors from each of these aspects included in- creasing revenue from market management and digitization, technical management specifically for meat storage, security and community management, parking management and market cleanliness management. Sustainable market development and management contains three main pillars, covering economic, environmental and social dimensions. In order to make development sustainable, ideally the benefits must be continuous and sustained. Development must achieve a

balance among economic, environmental, and social objectives with growing recognition of sustainability's value and sustainable development practices have been adopted across multiple sectors. This literature has focused on how to make public markets in Indonesia more sustainable. It uses the Standard National Indonesia (SNI) to determine how well a market is performing. The study found that these standards can help them become more specific, in order to improve their sustainability. Markets should focus on good planning, the use of technology and balancing economic, environmental and social objectives.

According to Victor Kihlstrom and Jorge Elben (2021), entitled "Constructing Market for a Solar Energy", for solar energy and photovoltaic systems (PVs) is being increasingly noticed as an interesting renewable alternative. PVs, which convert sunlight into electricity, are a clean and quiet substitute for fossil fuel. This technology has experienced incredible growth in recent years, making it one of the most promising forms of renewable technology. The aim of this literature is to find out what overall conclusions may be drawn after 40 years of experience in trying to establish the PV technology on the market through market interventions. A systematic literature review of peer-reviewed studies on PV technology and market interventions from 1979 to 2019 is presented. The need for interventions does not look to decrease in the near future. The review also shows that market constructions by governments are short term in character. A conclusion drawn is that governments may sustain market interventions until no desirable sources of energy are phased out.

According to the study by Afifi (2025), entitled “Sustainable Markets and How to Create a Healthy Environment Built on Effective Foundations for Efficient Resources: An Applied Study of Market Square at Al-Manshiya Central Zone in Alexandria,” Some markets have emerged amidst public buildings, homes, and residential areas, leading to increased visual and auditory pollution.The study shows that the human activities such as greenhouse gases and the consumption of non-renewable resources is stressing the need to change towards renewable energy and apply sustainable development principles. The researcher proposes a project idea that combines closed and open markets to create a "Market Square," where the space is divided and designed into platforms, sales areas, and warehouses equipped with cold and dry storage rooms, as well as service halls like waiting areas and cafes. it explains the transformation of food exchange from open markets to covered markets for reasons related to investment, economy, and health. The results shows that designing an eco-friendly commercial market using a containers to create sales units and platforms within the market, along with some environmental treatments is enhancing the building performance and improve air quality and natural air circulation. the lightweight construction materials with eco-friendly containers, as cement production releases a ton of carbon dioxide for every ton produced. Container structures require less cement and concrete compared to bricks and mortar. Using technology can achieve and create interactive and sustainable work environments suitable for designing a sustainable market that fulfills all aspects of environmental, economic, and social sustainability. The study suggest that the market model should be designed there

that achieves sustainability, aligning with the "Go Green" initiative and preserving the rights of future generations in progress.

This article by Firmansyah (2021), titled "Sustainability Status and Optimization of the Public Market Performance" discussed on how they can improve and make more comfortable the traditional public market. The researchers identifies problems like not well organized, large number of garbage piles scattered, dirty and uncomfortable place which are as if attached to traditional market picture. The study use Multidimensional Scaling (MDS) method that can broadly cover the factors related to the dimensions of the public market requirements in SNI by determining the two points which are the basis of reference, that is, good and bad. MDS sustainability analysis of the SNI (Indonesian National Standard) implementation in the public market is carried out through several stages, namely the stage of determining the attributes of functions covering three dimensions (dimensions of general, technical and management requirements). Dimensions of general requirements can be seen from the location of the market, cleanliness and health, safety and comfort. The findings shows five aspects that influence sustainability: general, technical, management, social and economic. The analysis emphasize such as do not provide comfort in air circulation, storage of wet food with low temperature and loading and unloading areas, market zoning information, conflicts among internal traders and the income of traders.

A article conducted by Boon et al. (2022), titled "Markets in sustainability transitions" they discussed the importance of public market for sustainable innovation and emphasis is on diffusion and user involvement. The researchers highlighted

special issues and nuanced the instance of markets and market formation in the context of transitions. The contributing articles show that markets are populated with a wide variety of actors, ranging from companies to community groups and public actors. The study gives a different perspective on public market such as early stages of sustainable technology development, Markets should not (only) be defined by activities of entrepreneurs nor restricted to their transactions with users, Markets can take different shapes and evolve during the course of transitions and many more. Based on the discussions it highlights extract main lessons about markets in transitions. In innovation and transition studies, entrepreneurs and especially large incumbents have been regarded as important players in shaping new markets such as how they affect the sales of solar home systems in rural markets, always being aware that suppliers are embedded in a network of other market actors with competitive configurations and associated power relations. Furthermore markets can have a certain directionality and be precursor to future market developments and the formation of new markets. In this light, the main takeaway is to investigate markets and the opportunities there are to shape them to favor sustainable transformation by taking a process perspective.

Local Literature

Remolino et al. (2023) conducted a study titled “Facility Layout Evaluation in Argao Public Market, Cebu, Philippines” The study assessed the design of the Argao Public Market's current facilities as well as the various aspects taken into account when

developing a new market layout in an effort to address the market's deteriorating conditions, which include disorganized stall arrangements, a lack of parking spaces for cars, poor policy implementation and a lack of supporting facilities. The statistical analysis of the data shows that Argao Public Market requires redesign due to poor layout which didn't attach to the standards for market construction. Based on the study's findings, it showed that separating is required for most of the areas were not Sufficiently divided based on the classes of products being sold which result from improper arrangement of stalls and lack of clear division by stall type and it makes hard for people to move around comfortably.

The proposed layout addresses these issues and Optimize management and customer experience. Using the Systematic Layout Planning (SLP) is a method for arranging spaces efficiently to improve work flow and reduce congestion. The study assess how the market shows the current layout diverged from typical market construction and design requirements. According to the scope of the evaluation (Veronica et al., 2023), the Argao Public Market's current layout does not meet these standards, resulting in poor space utilization, stall mismanagement, and congestion. To ensure effectiveness, organization, and sustainability, the study thus underlines the necessity of redesigning and improving the layout of the Argao Public Market to show how will improve it. In order to maintain and help market's function in urban life and handle population growth, a revised facility layout is required. The study examined the Argao Public Market's current facility layout in Poblacion Argao, Cebu.(2023) Argao Public Market, while more than halfway meeting the standards, still needs to

improve its facility layout in terms of the positioning of the stalls, the arrangement of the different sections, the drainage systems, the development of proper roads or pathways, the assurance of proper roofing, the provision of an area for loading and unloading stations, the modification and improvement of parking spaces, and the creation of a layout that can accommodate market visitors while simplifying their buying and selling activity and providing them with convenience in their operations and offering long-term solution to the Argao local government unit in future years, issuing assistance to significant issues present in the current facility. This study shows how they evaluate the existing facility layout of the Argao Public Market in Cebu, Philippines, to identify design and operational problems such as congestion, poor stall organization, and inadequate supporting facilities. It aims to propose a new market layout plan that adheres to proper design standards and improves market efficiency, accessibility, and functionality for both vendors and consumers.

According (JACK B. ISOLANA, JD, DPA., 2021) Their study examined the internalization of core-values of New Public Management (NPM) among Local Government Units (LGUs) in the Philippines in their effort to reform the management and operation of public markets. Using Public-Private Partnership (PPP) as a framework of NPM for infrastructure development and service delivery, the study assessed the performance of PPP/BOT Public Markets in addressing the perennial problems of public markets in the Philippines. It inquired whether or not PPP as an instrument of reform has improved the management and operation of public markets. The study is mainly about governance and management of public markets in the

Philippines. Particularly, it examined how public - private partnerships (PPP) used by Local Government Units (LGUs) guided by New Public Management (NPM) principles, to reform public markets. Where it focused on five PPP-managed public markets in Mandaluyong Public Market, Carmen (Cagayan de Oro), Suki Market (Quezon City), and Bocaue Public Market (Bulacan). The research shows how local governments in the Philippines try to enhance public markets by working together with private companies Public-Private Partnership. At first, their prepared that the markets look better, cleaner, more organized, and with more income. But when the PPP left and the local government handled the markets again, the improvements was only temporary. The study highlights that a public markets will only stay sustainable if local governments make lasting rules, systems, and policies that fit their own needs that will help in improving public markets.

As state to study of Carmen, Lima, Te, Toledo, & Hernando, (2021), This study suggests for an accredited apex organization of wet market vendors association in Iloilo City with representation in the city legislative council to ensure participation in local policy formulation for the growth and development of wet market enterprises. The study once vendors to unite and have a voice in city government so they can help create policies that improve and sustain markets. The wet markets provide affordable agricultural and fishery products were also serving as business spaces for small scale entrepreneurs this makes them vital to local development and community livelihood (zhong et Al., 2020). This paper sought to find out the external environment, resources, enterprise components, and business outputs of the wet markets in Iloilo City. It also

explored various local governance initiatives to assist the business growth and development of these wet markets. Using a descriptive design and interviews with 100 wet market entrepreneurs in Iloilo City, findings reveal that wet market operations are affected by external environmental forces. (Carmen, Lima, Te, Toledo, & Hernando, 2020). Based of what they found on how political forces affecting businesses of wet market businesses in Iloilo City are influenced by various legal and political mandates. More than half of the respondents (57%) said the TRAIN Law (RA 10963), which changes taxation policies, affects their products. Meanwhile, 44% mentioned they were affected by government subsidies or support, 29% benefited from government programs and seminars, and 20% said rental fees impact their business operations.

This shows how external pressure that create both opportunities and threats for organization, forcing them to adapt in order to survive and succeed. This study was conducted at the University of the Philippines Diliman College of Law. They conducted a study to give vendors a voice in government, to help in the creation of policies or laws that will help them. To ensure that vendors are included in the creation of policies that will grow and develop the markets, they conducted a study here. There are factors that affect wet markets, including external forces such as laws, government policies and programs, and rent payments. Also included is the importance of an organization of vendors in wet markets and the impact of policies and laws on vendors and ways to improve the conditions of wet markets.

Local literature and studies In the Philippines, several studies have examined that connects to a same relationship. According to Pascual et al. (2020) They had A

semi-structured interview protocol was developed based primarily on a review of the existing literature. Respondents were residents of Tacloban City. Participants included students and housewives, mostly aged 18 – 45 years. The demographic profile shows that women were dominant (24 out of 28), highlighting their strong role in household food shopping decisions. The protocol was designed to explore participants' attitudes towards buying foods from the local public market and from grocery stores in shopping malls, their views on the attitudes of other people, and the extent to which they felt that they had control over what they bought. The protocol began by establishing a shared understanding of foods sold at the local public market (local and regionally produced foods) and private grocery stores like in big malls (nationally produced and imported foods) within each group. The protocol then moved on to a range of open- ended questions to be addressed during the course of each interview concerning attitudes towards buying foods from the local public market and grocery stores in shopping malls, as well as questions regarding the views of friends, family and society in general towards buying local foods. The study investigates why consumers prefer to buy food from the local public markets versus grocery stores in big malls.

The Findings emphasize that public markets remain vital sustainability as they provide fresher food, support local farmers, and strengthen community traditions like suki and tabo (market day) tradition provides more product choices and lower costs, however challenges remain in terms of infrastructure that public markets lacked parking places and convenience and time flexibility, making them less attractive for

some shoppers and still limit their competitiveness against modern grocery stores were preferred for comfort, security, air-conditioning, and speed of transactions. This study highlights the consumer perceive differences in control, trust, and control connection when buying local markets. This also shows that public markets are not only places for buying food what also important for sustainability because they promote local and regional food, provide more affordable and accessible food choices for families, and reduce dependence on import goods supporting local and food economy.

According to Vu Ngoc Xuan (2024) This paper titled "Factors Affecting Renewable Energy for Sustainable Development: The Case of the Philippines" examines the center between carbon dioxide (CO2) emissions, electricity consumption, fossil fuels, foreign direct investment (FDI), gross domestic product (GDP), and renewable energy in the Philippines. This paper also find the complex relationships between carbon dioxide (CO2) emissions, electricity consumption, fossil fuel use, foreign direct investment (FDI), gross domestic product (GDP), and renewable energy in the Philippines. Using time-series data from 1990-2022 and applying new econometric techniques such as vector error correction modeling (VECM) and Granger causality tests. Based on their study, they also reveals that they had a serious Effects of economic growth and energy consumption on CO2 emissions. The findings shows the vital role of renewable energy in mitigating environmental degradation. Ramifications of the Policy are discussed in the context of the Philippines' commitment to sustainable development and climate change reduction, highlighting the need for integrated policies that encourage renewable energy and

energy efficiency beside economic growth. The study engage time-series data from 1990 to 2022 and applies advanced econometric techniques, together with vector error correction modeling (VECM) and Granger causality tests. The study also recognized that the foreign direct investment had no significant impact on emissions. In general, it completes that the Philippines must improve renewable energy adoption and energy efficiency policies to stabilize economic growth with environmental sustainability. The study examines the possible factors influencing renewable energy development in the Philippines and its role in accomplishing sustainable growth. It also found that enlarged use of renewable energy significantly reduces carbon emissions, while high used on fossil fuels and electricity consumption give to environmental deterioration. This study highlights the significance of promoting clean energy backing, energy efficiency, and green economic policies to help sustainable institutions. This also connects to a sustainable public market by showing up the need to combine renewable energy sources, including solar panels or energy efficient systems into market infrastructure. This can help decrease operating expenses, reduce carbon emissions, and encourage environmentally friendly spaces that supports the country's sustainability objectives for people who's affecting on it.

Foreign Studies

According to Liman A. (2024). The Design for proposal for modern market in Song, Adamawa State, Nigeria. Disorderly form of physical erections is a common

planning problem of Nigerian regional markets, poor physical arrangement, congestion, inadequate stalls and parking spaces as well insufficient; facilities utilities and services has been problems facing Song market, Adamawa state, this has hindered a crucial market environment as a medium for providing the population of the surrounding catchment areas for the effective exchange of goods and services. The study of this paper is to assess the conditions of Song regional market as well as evaluating the physical characteristics of the market with the view of identifying the available facilities in market and designing a comprehensive regional modern Market for the Local Government area.

The Planning proposals has been suggested to a new modern market to boost commercial activities in the area while the study recommended some token amount of money to be paid as sanitation fare by the traders, which will serve as revenue generation income in supporting the sanitary exercises in the market. A market is a physical or virtual space where buyers and sellers engage in the exchange of goods and services through mutual agreements. This interaction drives the efficient distribution and allocation of resources, fostering economic activity by stimulating production and trade. By connecting supply and demand, markets contribute to societal well-being and enhance the quality of life for individuals and communities. In view of the above issue, the present study shows the problems in traditional public markets. This is the main reason why this study is being conducted. This study also includes the condition and characteristics of the market in an area, this is important to know what is needed and can help in modernization when it comes to building a

market. This study also includes the design of a modern market that provides solutions to the problems. It also includes the impact of the market on the economy, people's homes and emphasizes the importance of the market in the community.

According to the study of Tabak and Yücel (2022) entitled “An Assessment of the Design Criteria of Market Areas in Terms Of Urban Space Quality” the open public spaces such ad squares, parks, and market places have not only served as hubs of economic mobility but also as centers with highly active social interaction. The open and semi-open market places are preferred by the people because they offer more affordable and cost-effective products compared to the shopping malls. This study aimed to investigate how market places as urban open or semi-open spaces had a place among the other functions in the city and how the quality of space was shaped by means of design criteria in a well-organized city.

The researcher used a qualitative-descriptive methodology combine with literature review with on-site observational analysis of urban space quality in Yeşilköy market (İstanbul), Kemerburgaz Bol Pazar market (İstanbul) and the Braga Market (Portugal) in terms of design criteria. These evaluations were applied by revealing the urban space quality criteria by evaluating in terms of design criteria such as on site selection, circulation, street furniture (light-ing, landscape and signing) determined for open market places through design guidelines and existing examples.The study, showed that today’s marketplaces were not only venues with mere function of selling fruits and vegetables, but also places created with care in terms of design. suggested that a well-designed marketplace, not only met the shopping requirements but also

accommodated different social needs. The improved versatility for different activity services increased people's tendency to prefer the marketplace in question. Bol Pazar,which was open on weekends, and the Braga Market,which was a converted design.

According to Shafira and Setiawan (2021), entitled "A Study of Natural Ventilation for Traditional Market at Sumur Batu, Central Jakarta,"Traditional markets as a place for human activities are very often used by some urban communities to meet their daily needs. The market was born from the desire of some people to obtain material needs. Besides, traditional markets play an important role as a driver for the development of people's economy throughout the country (Malano, 2011). However, the current traditional market conditions are still very poor condition. Dirty, muddy,smelly,and stuffy become people's perception of traditional markets that make visitors uncomfortable. This is due to inadequate natural exhaustion factors that make the market feel hot and stuffy and do not meet the provisions in air circulation planning.

The study focused on applying the concept of natural ventilation in traditional market buildings in Jakarta to improve thermal comfort that can affect the convenience of traditional market users. The step of study are as follows: (1) to study the wind patterns on the site, (2) to study the building forms and openings locations to reach the optimum outcome of natural ventilation, (3) to study the result of simulation from several alternative design that have been made according to natural ventilation standards. The findings shows that optimizing natural ventilation, wind speed can

affect the comfort of the human body during activities. To add comfort in the market, wind gusts with a speed of 0.5-1.0 m/s are needed so that market users can feel cool in their activities (Building Physics, 2015). Based on the results of the research test, the Buoyancy-Stack Ventilation type (Table 3) is an example of a building shape suitable for use on the site in order to make the best use of the wind. The simulation results in Tables 2-5 prove that the presence of voids in the building will cause the wind to fluctuate to the upper floors. The turbulent nature of the wind indicates that the wind can spread upwards due to voids in the building. Then, the use of stack-ventilation functions to accelerate the process of wind exchange bypassing through the roof hole so that the cool and clean wind quality can last a long time in the building. Furthermore, the use of mezzanine floors in buildings can spread the wind more widely so that conditions in the market feel airy.

Based on the study of Cansian et al. (2025), entitled “Nature-Based Solutions for Urban Drainage: A Systematic Review of Sizing and Monitoring Methods”Urban water directly influences public health, equity in access, food security, and quality of life. Flood events can cause substantial economic losses, environmental degradation, and human casualties worldwide .Urban water management depends on regulatory frameworks and encompasses aspects such as potable water supply, sanitation, ecosystem health, governance, and risk management. However, challenges persist, particularly in relation to outdated urban planning models and insufficient stormwater drainage infrastructure. Alternative approaches, such as compensatory techniques and Nature-Based Solutions (NbSs), are increasingly recognized as viable strategies to

improve stormwater management and reduce urban flooding. These approaches allow integration with conventional infrastructure and help mitigate the negative impacts of unplanned urban growth. Nature-Based Solutions (NbSs)are operationalized through decentralized systems such as bioretention cells, permeable pavements, infiltration trenches, detention basins, and green roofs, which allow stormwater to infiltrate, be stored temporarily, or evaporate on site. These systems are designed not only to reduce runoff volume and peak flow, but also to enhance water quality and contribute to urban cooling and biodiversity. In this context, Nature-Based Solutions (NbSs), especially Sustainable Urban Drainage Systems (SUDSs), have emerged as viable strategies to enhance water resilience and sustainability.

This study conducts a systematic review following the PRISMA protocol, combined with bibliometric and co-occurrence analyses, to identify prevailing approaches in the sizing and monitoring of NbS-based SUDSs. Based on the peer-reviewed literature indexed in Scopus and Web of Science from 2020 to 2024, the findings reveal an increasing integration of hydrological modeling with artificial intelligence, remote sensing, and IoT-based real-time monitoring. Despite this progress, challenges remain in methodology validation, data availability, and system adaptability. Ultimately, the convergence of technological, ecological, and participatory approaches will be essential for building truly resilient and Sustainable Urban Drainage Systems in the face of climate uncertainty and rapid urbanization.

According the study of Borucka et al. (2022) entitled “Market Regeneration in Line with Sustainable Urban Development” the existence of traditional markets has

been an integral part of the lives of urban communities, but their role is seen only as a space of trade, often used only for two days of the week. at the same time, there is a growing demand for local centres in every neighborhood, and a lack of meeting places for residents. Transforming existing markets into vital public space, therefore, can also be important for the local community. The transformed marketplace can create a space for multiple purposes: place for trade, meeting place, cultural venues and restaurant zones. This study focused on the optimal design solutions for regeneration of marketplaces. The reseachers examines the design variants for the revitalisation of the marketplace, in particular, investment in their modernisation in order to find the most optimal model for transforming these public spaces to have a significant impact on the city's development.

The study concluded that by balancing the costs versus spatial solutions, it is possible to effectively improve the current management structures of marketplaces and, as a result, transform them as living public spaces. They conclude that the balance between cost and design assumptions informs implementation in various conditions, allowing for the changing nature of local markets to thrive and bring them closer to the inhabitants in a more sustainable way. The findings shows that regeneration process is undoubtedly complex, and must take into account social, spatial, cost, time, functionality, safety and environmental criteria. Optimisation of solutions should be carried out in many forms through workshops, public consultation, environmental interviews, on many occasions and at various stages of preparation, sometimes also during the implementation of the investment. The recommended solution (Model 2)

takes into account the long-term forecast of pedestrian traffic, as well as other parameters. Consequently, this solution ensures the safety of the public space is maintained at the highest level, whilst allowing successful redevelopment of the marketplace and the whole district, and it takes into account issues such as a reduction in the degradation of the public space, and the material, environmental and economic losses of its sellers, buyers, inhabitant. Implementation of the optimal design variant is crucial in the context of successful regeneration and ensuring a so-called “domino effect” of the project. In this context, the future of the marketplace after implementation of the chosen variant-model seems to be very promising for the further development of the entire district.

Local Studies

As state by Moore R. (2023) this research is to establish a Public Market in the upper east part of Bacolod City, where potential businesses can be utilized to support the development and enhancement of the city's economy and industry. This study will also promote sustainable approaches to have a safe, living-built environments in relation to the proposed building structure. The researcher employed the descriptive method of research in this study to identify the issues related to the Public Market. The study fits with the institution's research mission of creating spaces that are advantageous to the population at large and take the environment into consideration. In order to promote sustainable development, the researcher is

personally driven to conduct this examination. Markets are typically managed by local government, but they have suffered from a lack of investment. Therefore, many marketplaces appear outdated and have inadequate. facilities (Studdert 2006). The typical public market is usually characterized by inadequate waste management and cleanliness standards, the existence of dishonest sellers; the absence of a process for handling consumer complaints, and a lack of operational procedures (Tan 2021). Traditional marketplaces have been superseded by the existence of contemporary markets. This is due to the fact that people prefer to buy in contemporary markets since the degree of comfort in modern markets is higher than in traditional marketplaces. (Sumantri et al. 2020). Sustainability is transitioning from an unsustainable state of activity to one that is improving and getting better.

The phrase essentially denotes a shift in perspective toward emphasizing lifestyles that are in harmony with the available renewable resources of the ecosystem and biosphere (Grierson 2003). In contrast to meeting current demands, which we refer to as consumption, sustainability is concerned with the welfare of future. This research focuses on creating an architectural design for a modern, sustainable public market in Bacolod City. This study is an important study to support the community when it comes to business in Bacolod City. The researchers believe that the completed project will have significant benefits for consumers and businesses by improving access to products and facilities that show growth in the city's income. This study is in line with the researchers' goal of creating community-focused spaces that provide

environmental consideration. The researcher is personally motivated to conduct this examination to promote sustainable development.

In the study of Bonete, Villaruz, Estillomo (2024) entitle "Operations and Sustainability of Banica Public Market". This study used a descriptive correlational research design to determine the relationship between the operation and sustainability of the Banica public market. The researchers recruited 350 respondents from vendors and buyers. They used convenience sampling techniques according to specific needs. The data were collected from the second week of December 2022 to the first week of January 2023 using their own questionnaire that focused on the level of operation and sustainability of the market. The data were analyzed using various statistical tools such as frequency count, percentage, mean, t-test, ANOVA, and Pearson correlation coefficient. All of these were done using the Statistical Package for the Social Sciences (SPSS) software. The study found that people's perceptions of the Banica Public Market differed based on their gender and education. However, there was no difference in perceptions based on age or type of respondent. Similarly, perceptions of the sustainability of the market differed based on gender and education, but there was no difference based on age or type of respondent. In addition, there is a connection between how the market is operated and how sustainable it is. The aims of this study review to determine the relationship between market operation and how sustainable it is. The relationship between the operation and sustainability of a public market, examining how the good way of operating a market affects its sustainability.

Base on study of Charmine S. et al. (2021) “Optimal Investment Strategy for Solar PV Integration in Residential Buildings: A Case Study in The Philippines”. The developing countries, particularly in rural areas, long periods of power outages are experienced as the electricity grid is technically or economically unfeasible. As solar photovoltaic (PV) is the most potential and suitable source of renewable energy for these areas, this paper analyzes the economic viability of its integration in different types of residential buildings. Applying real options approach under uncertainty in electricity prices, this study compares the attractiveness of adopting solar PV over continuing electricity from the grid focusing on various investment payment. schemes including, full payment, distributed payment for 5 or 10 years without a down payment, and distributed payment for 5 or 10 years with 20% or 40% down payment. The study suggests the government, particularly in developing countries, to support the integration of own-use solar PV in buildings through incentives and subsidies, as well as financial institutions to offer more affordable terms of payment that encourages low to medium income households to adopt solar PV. Further, this will not only augment the energy deficiency in these countries but also support the global aspirations of reducing greenhouse gas emissions and its adverse effects through gradually shifting to renewable sources of energy.

Buildings are responsible for over one-third of global final energy consumption and 28% of the total direct and indirect energy-related carbon dioxide (CO2) emissions (International Energy Agency (IEA) 2020). The integration of solar photovoltaic (PV) plays an important role in the development of more sustainable

buildings and brings significant changes in power systems. According to IEA report (2019), the integration of solar PV systems on residential, commercial, and industrial buildings is taking off in the next five years accounting to 60% of the world's total renewable-based power capacity growth and transforming the way electricity is generated and consumed. The use of solar panels is a great help in poor countries. This study is about whether the government will help people to have or install solar panels in public places and homes. Through this, many families and areas will have electricity and pollution will be reduced.

In this study of Custodio (2021) entitle "Greening opportunities and prospect for Philippines cooperatives toward a more sustainable food market" provide important information about the impacts of climate change on cooperatives are a growing concern that needs to be urgently addressed for a cooperative to become competitive and sustainable in the long run. This study presents the cooperative case for going green where opportunities and prospects for greening the practices and business activities of Philippine cooperatives are tackled in the context of enhancing their competitiveness, resilience, and sustainability. It show that cooperatives are capable of integrating green practices in their operations and in doing so, can promote sustainable food marketing in terms of reducing their operating costs, recapturing value from their products and byproducts, enhancing their resiliency, and using natural resources efficiently.

The strategy can be applied across all economic levels and sectors, and joint, cross-sectoral greening efforts are expected to yield significantly greater impact than

individual actions. This study is about the development of cooperatives in the Philippines while protecting the environment. This study also refers to what is called "green growth", meaning economic growth that does not harm the environment and helps people. Because when they do this, they will save money, be bigger, more stable and use natural resources more efficiently. They will help sell healthy food that does not harm the environment. This study reminds us that cooperatives must be eco-friendly so that they can develop and avoid damaging the environment. Everyone should think about "green growth" so that the economy can develop and take care of the environment at the same time.

According to Emerissa Jane Tendero (2023) on the study entitled “Waste management practices for food and agricultural by- products : case studies of public markets in zamboanga city” this research study focuses on waste management practices related to food products and by-producting agriculture in public markets to manage waste generated in these sectors. Through the collection of primary data via interviews and on site observation, this research investigates the effectiveness of waste management system in addressing the environmental and health concerns associated with food and agricultural by product waste. While the study identifies commendable efforts in waste segregation and recycling significant gaps persist in terms of collection, disposal, and overall waste reduction strategies.

Despite the existence of regulations and policies, the lack of awareness, limited infrastructure, and inadequate coordination among stakeholders hinder the proper implementation of waste management practices. The lack of waste management,

limited infrastructure and poor management are major environmental problems. In Zamboanga City, the researchers are facing a problem when it comes to waste, and they are looking for ways to solve the problem. They decided to use ideas about nature and society to understand why they are still struggling when it comes to waste due to the increasing amount of waste. This introduction provides a comprehensive overview of the research study, outlining its main goal, research question, theoretical and conceptual frameworks, and the logical framework (LogFrame) guiding the research. The researchers include the introduction highlights the rationale for undertaking this study, its objective, expected outputs, outcomes, and impact, as well as the key activities and indicators used to assess progress and success.

This method is used by the government to dispose of waste in the public market. The researcher in this study wants to know what is the best way to reduce and prevent the increase in waste and prevent its negative impact on health and the environment. This in important because if waste is not disposed of properly, it can cause harm to health and the environment. This study shows how it can provide a clear and proper solution to the problem, by answering the questions and the methods they used to answer the questions.

Synthesis of Review of Related Literature and Studies

The existence of a market in an area has always been a focus point that functions as a center for the exchange of goods from a group of traders in strategic locations that sell merchandise in groups and then it develops. The concept of sustainable development has been widely applied in various sectors and fields along with increasing awareness of the importance of sustainability. Furthermore many public market are not sustainable and not well organized. As stated by Firmansyah (2021), The existence of modern markets has displaced the existence of traditional markets. This is due to the fact that people tend to be more interested in shopping at modern markets because in modern market the level of comfort is higher than that in traditional markets. Based on the study using air circulation, waste segregation and solar panel can provide a comfort. Designing markets in a sustainable way helps the economy, protects the environment and makes communities safe and stronger.

CHAPTER 3

Research Methodology

This part of the study present the methods and procedures used in the study: The respondents and their descriptions: The survey questionnaires: and statistical treatment of data used to answer the problems raised on the onset of the study. The study mainly focuses in the Barangay Minuyan Norzagaray Bulacan.

Research Design

The design used in this research study is a mixed method, which combined both qualitative and quantitative data. According to Creswell (2014), “The combination of qualitative and quantitative methods provides a better understanding of research problems than either approach alone.” By used this method approach allowed the researchers to combine numerical analysis with descriptive design. A constructed questionnaire was as a primary instrument for securing data and information requirement of the study. Actual observation and interview were also constructed by the researchers to gather added information in the process of completing the data.

Sample and Population

The total sample responded participants for one hundred (100) was randomly selected from the Brangay Minuyan Norzagaray Bulacan. The target population for this research consist of estimate (100) household living in our project. One respondent per family, at least 18 years old above.

From this total a sample of 100 individual respondents will be selected. The sampling technique used is purposive sampling, where the respondents are selected based on their availability and willingness to participate.

SAMPLE SIZE

- Total population: (100 household)
- Sample size: 100 respondents

Research Instrument

The researcher showing here the questions and identifying what of questionnaire we prepare and give some insights by describing our instrument that we use to assess and improve the structural integrity of a public market. In this part we prepare the necessary questionnaire to gather data and information required for the respondent. The researcher used a 5-point Likert scales for closed-ended questionnaire.

We also use software like STAAD for advanced connect for structural to ensure engineering compliance, Auto cad for creating plan and lay outs and Microsoft excel for complex computations.

Data gathering procedure

The researchers used Quantitative method in collecting the data. A 5 point likert scales questionnaire was distributed to selected respondents, including sellers, customers and municipalities of Barangay Minuyan Norzagaray Bulacan. The questionnaire focused on community needs and current condition in the absence of public market focusing on accessibility, safety, and connivence. Before distribution, the instrument was validated by the research advisers and field experts to ensure its accuracy and relevance to the study. After validation, a formal request letter was sent to the Barangay Minuyan to secure permission to conduct the survey. Once approved, the researchers distributed the questionnaires personally to ensure proper guidance and higher response data.

Statistical Treatment

The gathered data were filed and summarized separately by the researchers. The responses for each question and category based on specific problem raised then are treated according to statistical techniques using percentage method and weight mean average process.

$$\% = S/N \times 100$$

Where:

S = The number of respondents

N = The total number respondents

% = The percentage

$$WM= (F)\ (x)\ /N$$

WM = Weighted mean

F = Frequency response

X = Weight of response

N = Total number of respondent